

INCREASING FEMALE PARTICIPATION IN TECHNOLOGY EDUCATION: A HONG KONG PERSPECTIVE

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Abstract: The educational and occupational opportunities afforded females and males in Hong Kong have generally not been the same. This disparity is built on history and tradition, an occurrence that exists in many other countries. Given the impact technology has on the lives of all individuals, it is imperative opportunities are provided to increase technology literacy, skills and attitudes of each and every one. This paper describes the past and current situation relating to technology education in Hong Kong. Descriptions of the steps being taken to increase female participation in the school subject, as well as initial results of such efforts are provided.

INTRODUCTION

As stated by Fu Xuan over 2000 years ago, *"How sad it is to be a woman! Nothing on earth is held so cheap"* (Waley, 1946). Even for a modern and progressive Asian society such as Hong Kong, some aspects of society's value of half its members still rings true today. Applied in the realm of education and the resulting employment opportunities education provides, girls in Hong Kong secondary schools have long been denied access to technical subjects and steered into traditional pursuits such as home economics and commercial subjects. Such practices have serious implications for a society that desires all members be technologically literate (Hong Kong Special Administrative Region Government, 1998).

For Hong Kong, government statistics suggest that women are not as involved as men in educational programs or occupations relating to technical subjects. As noted by Lee (1996), women and men are segregated in different occupations due to a "formidable combination of gender-socialization, education, and labour market mechanisms" (p.288). These "job ghettos" typically offer low pay, no security and little chance for advancement. Lee further commented that although educational opportunities have increased for women, "human capital theory", whereby people with people with equal educational credential *should* have the same amount of human capital, is not significant to explain the persistence of gender segregation and inequality in Hong Kong.

For instance, women are more likely to be found in clerical and unskilled work, while men are found in managerial, professional and technical work. Westwood, Mehra, & Cheung's (1995) data on the subject revealed men were, on average, over six times more represented in the latter professional areas. Further evidence can also be provided. Although women make up 44 percent of the total working population, only 26 percent of the "data processing and tabulation services category were women" (Hong Kong Government, 1997). At the Hong Kong University of Science and Technology, only 4 of 80 professors in the computer science and electronic engineering departments are women, creating a shortage of role models for women (Scott, 1998).

A HISTORY OF TECHNOLOGY EDUCATION IN HONG KONG

Given the important role education has in shaping society, the history of technology (technical) education in Hong Kong has not been stellar in contributing to opportunity or equality. With a junior technical school opening in 1932 and soon afterwards a Junior Technical College offering the subjects of pattern making, technical drawing, furniture making, metalwork, and shoemaking it was not until the early 1950s, that *any* form of technical education was available for girls. This was a technical school providing secretarial and domestic subjects. During the 1960s to 1970s, Hong Kong's educational programs began to change. The number of schools increased, schools were re-aligned, and a common core of subject matter introduced. Prevocational schools were a new concept, providing basic technical skills to around five percent of the total junior secondary students. What can be observed today are the three secondary programs; grammar, technical, and pre-vocational, with only the former concentrating on those students preparing for further university studies.

In the early 1970s a White Paper (Hong Kong Education Department, 1974) recommended a new subject of Design and Technology (D&T) as a common core subject in general education. Conceived as a vehicle to introduce technology to students in the lower-secondary grades, the subject was to move beyond the craft-based approach of traditional woodworking and metal working. Sadly, enthusiasm soon waned as the traditional approaches continued. Furthermore, despite Education Department recommendations, D&T was never fully introduced in *all* schools and to *all* students. Today, much of D&T reflects a dated syllabus, inadequate facilities, poor public perception, lack of new D&T teachers being recruited, and inability to allow a wide-range of students to fully participate in the programme (Volk, Yeung, & Siu, 1997). As is described later in this paper, new initiatives and ideas about technology education are beginning to take hold, with the subject about to be transformed.

Regarding equal access and participation in the subject, not all schools offer D&T. And even in those schools which do offer D&T, currently only a handful allow girls. Gender bias in D&T is based on a combination of cultural and structural conditions. In schools with D&T, girls generally only take home economics, as D&T is not perceived as a female subject. School principals contribute to this discrimination by their insistence to schedule students' classes based on gender (Volk, Yeung, & Siu, 1997). In short, they find it much easier for arranging the timetable. Again, just as the subject of technology is about to change, so too is the access to it!

WHAT IS BEING DONE AT HKIED

At The Hong Kong Institute of Education, where over 4,000 students are preparing to be teachers, several initiatives to increase female participation in careers relating to technology have recently been introduced. With education seen as a necessary component for societal change, proactive steps are being taken in research, teacher preparation programmes and school curriculum. The following section provides examples of the work currently undertaken.

Pupils' Attitudes Toward Technology Study

The attitudes students have about technology, whether received through parents, peers, schooling, or one's daily life experience, plays an important role in their ability to actively participate in their current and future technological world. To examine whether there are differences in Hong Kong pupils' attitudes toward technology, an instrument was administered to nearly 3,500 Hong Kong secondary school students (Volk & Yip, 1998a). Data received were used to compare girls' and

boys' attitudes toward technology and six attitude categories of: a) career options, b) schooling required, c) consequences of technology, d) interest in technology, e) technology as an activity for both boys and girls, and f) the perceived difficulty of technology.

The major results of the study on Hong Kong Pupils' Attitudes Toward Technology can be summarized as follows:

- For the demographic characteristics areas such as 'Gender', 'Will Choose a Technological Profession', and 'Have Taken D&T or Technical Subject in School', significant attitudinal differences were observed in all six attitude categories.
- Boys were found to have more-positive attitudes than girls for all attitude categories except that of 'Role Patterns'. In this category, girls had more positive attitudes than boys, indicating girls had more positive attitudes about their being able to participate in technology activities and careers.
- When both boys and girls have a 'Working Space at Home' or 'Have Taken D&T or Technical Subject in School', significant differences disappeared in several attitude categories.

Important to notice, was the effect of having 'Taken D&T or a Technical Subject' on students' attitudes toward technology being an activity for *both* boys and girls ('Role Pattern'). The gender difference was not significant when both boys and girls experienced this characteristic. In fact, the attitudes were exactly the same. What this suggests is the positive effect education, especially technical education, can play on forming *all* students' attitudes about technology.

One significant result of the study was that it acted as a catalyst for change in the program offerings in schools. With a summary report prepared, (Volk & Yip, 1998b) a copy was sent to the Equal Opportunities Commission (EOC), highlighting problems and concerns with the current practice, specifically relating to laws covering equal access to educational benefits, services and facilities. Soon the EOC examined the matter and did their own survey of practices in schools, asking principals about the subjects girls and boys were allowed to take. Not surprising, their findings mirrored Volk and Yip's, and thus began a strong push to expand school subjects. Notice was served to the Education Department that changes must occur, not only for D&T, but for Home Economics. Obvious concern and some resistance followed, with issues again centering around scheduling. In October 1999, a forum sponsored by the EOC was held at the Hong Kong Convention & Exhibition Centre to explain the required changes and discuss resource issues. It was a lively session, with many concerns raised. Nevertheless, the requirement for schools to change was not open for debate, leaving principals and teachers with a challenge to meet.

At the time of this writing, schools are slowly implementing the changes, some with mixed classes or gender-specific, while others are figured to comply in the near future. Programs have also slowly begun to change such features as the type of activities, materials used and tools/equipment. Teachers recognize the need for change and seem willing to try.

Changes in Teacher Preparation Programs

The Hong Kong Institute of Education is newly-established, combining the five former colleges of education that were located throughout Hong Kong. Prior to HKIED's establishment in 1995, D&T and other technical teachers were prepared at the Hong Kong Technical Teachers' College. Most notable of the changes with the new Institute is the new Tai Po campus recently opened in 1997, north in the New Territories. This state-of-the-art campus houses all program areas and students formerly located in separate campuses.

As the new campus was originally planned by the Education Department before the Institute's current staff was recruited, maintaining the status quo was evident. This was demonstrated by the

original plan to have the Design & Technology facility reflect a traditional skills-centered approach. In this way, the five workshops were to include woodworking, metalworking, plastics, electricity and drafting. So unimaginative was the planned D&T facility, the drafting room included only board drafting, as computers are not mentioned in the current D&T syllabus!

The establishment of HKIED enabled a sizable number of new lecturing staff to be recruited in the department that prepared technical teachers. One major result of this change was a re-examination of program philosophy, courses and facility needs. Soon, it was agreed that the new facilities for preparing D&T teachers should now reflect a philosophy based on subject integration, rather than segregation; new technology, rather than old; an exploration of design and creativity, rather than a simple mastery of skills, and a concern about attracting students from non-traditional sources. For the latter, this naturally included women.

Some of the resulting facility changes include a 3-D studio, combining wood, plastics and metals; a system technology lab, introducing a variety of “modular” activities for all HKIED students as well as school children; an electronics lab containing control technology and hydraulics/pneumatics; and a graphics lab with networked computers and a variety of software. A new entrance examination was also put in place, de-emphasizing hand skills and emphasizing creativity, problem-solving and action-based learning. The examination is also used as a “recruiting tool” to familiarize those students who did not have the opportunity to take D&T in schools. So successful has been this change in emphasis and recruitment, that not only have women just recently began to enter the program, but this year, for the first time a majority of the incoming class is female!

This 2000-2001 academic year welcomes the first cohort of Bachelor of Education students who will major in D&T. This new program is designed to replace the 2 or 3 year Certificate in Education program that is being phased out, as the government will soon be requiring an all-degreed teaching force. This BEd in D&T is built on the success of the previously revised CE, and will no doubt lead the way in the new D&T programs for schools.

Expanded In-Service Programmes for Teachers

The major initiative being carried out by the Department of Information and Applied Technology in HKIED for in-service teachers is the biannual Science & Technology Education Conference (STEC) held each spring. This two-day conference attracts over 500 teachers to workshops designed to expand their understanding of technology. As the key to increasing primary students’ knowledge and attitudes, it is imperative their teachers are comfortable with the subject. For this reason, primary teachers are strongly urged to attend, for it is at the primary years that students’ attitudes between begin to differentiate between gender (Zuzovsky, 1996).

STEC’s have proven to be a success, providing teachers with hands-on experience in a number of areas. For instance, there were sessions on computer applications, lasers, robotics, and even hot-air balloons! Although some of the equipment necessary to repeat such activities in their own school is not available, it is hoped the experience received at STEC will translate into examples, stories and experience the teachers can use in their daily teaching. Especially for primary teachers, it is important their positive attitudes about technology are transferred to *all* their students!

NEW TECHNOLOGY EDUCATION CURRICULUM IN SCHOOLS

Fortunately, in Hong Kong’s technology programs, some changes are beginning to occur. As a result of the *Review of Prevocational Education* (Curriculum Development Institute, 1997), a new course called Fundamentals of Technology will be required of all pre-vocational students to take.

The proposal recommends that *all* students (girls included) take this subject, a radical change from the gender-biased programs that are now the norm. The course will include a variety of technology activities and topics, and will replace the outdated metalworking subjects.

New syllabi, equipment and facility designs for the existing D&T programs are also soon to be implemented. This is particularly important for the lower secondary programs, which are extremely dated and of low esteem. For the new D&T programs, features such as the increased use of information technology, computer graphics, modeling, and the use of multiple materials are being proposed. It is expected that features such as problem-based learning, a reduction in skill development, and more problem-solving activities relating to technology will be hallmark features of the new program. It is also expected greater opportunities and attractiveness to study the subject will more naturally occur. This new D&T will be implemented in the 2000-2001 academic year.

Finally, more exciting and bold initiatives are being proposed for the *entire* Hong Kong educational system, not only for the curriculum, but for school arrangement (K-tertiary), admissions, and the way teachers are prepared. A series of reports dealing with the *Education Blueprint for the 21st Century* are being released (see Education Commission, 1999/2000).. One important aspect relating to technology education is the recognition of the subject as being a Key Learning Area for *all* students in *all* grades, and in *all* schools. Although specifics are still to be debated through numerous consultation sessions, it is proposed the Technology Education KLA will among others:

- Offer real, relevant and purposeful learning experiences to enhance students' understanding and capability in response to the rapid changing technological society; and
- Enhance focus on technology by integrating or modularizing subjects such as Design Fundamentals and Technology Fundamentals.

No doubt, should these proposals be put in place, increased female participation in Technology Education and future careers relating to technology will naturally occur.

WHAT NEEDS TO BE DONE

One major area that still needs to be addressed is the way and manner technology education is taught or encouraged in *all* schools, not just in Hong Kong. As space precludes extensive discussion, the following are only suggestions, based on the author's work in the area:

- Classroom Dynamics: Basic point is that men and women (boys & girls) act differently in classroom situations. A teacher must recognize and encourage participation and questioning. Also, create a sense of "community" within the classroom.
- Reduce Competition: Low morale often results from a competitive environment. Use collaborative work, encourage pass/fail options.
- Consider Alternate Assessments: Give encouragement, and eliminate the grading curve.
- Fight Stereotypes: Obviously remove stereotypes to ability, careers, etc. No sexual references or jokes can be tolerated, even in all-male settings.
- Expand Outreach Programs: Programs such as the Technology Adventures Program, initiated by the author while at East Carolina University (Volk & Holsey, 1996), can be used to recruit females and/or provide role models for their future career options. TAP was a two-week summer program in high technology for secondary school girls. Each summer, around 40 girls would be exposed to hands-on activities conducted by female lecturers. Counseling was an integral part of the program, with the hope of increasing positive attitudes and motivation.

CONCLUSION

This paper has presented some of the important and relevant issues relating to increasing female participation in Hong Kong's technology education programs. No doubt, that given the tradition of education and stereotypes that exists in Hong Kong, there is much work left to be done. Hopefully through some of the initiatives outlined and proposals being made by the education bodies, more fruitful results will soon emerge!

REFERENCES

- Curriculum Development Institute. (1997): Review of Prevocational Education Hong Kong: Author.
- Education Commission (1999): Education Blueprint for the 21st Century: Review of Education System: Framework for Education Reform. Hong Kong Government.
- Education Commission (2000): Excel and Grow: Review of Education System: education Blueprint for the 21st Century. Hong Kong Government.
- Hong Kong Government. (1997): Census. Statistics Department, Hong Kong: Author.
- Hong Kong Special Administrative Region Government (1998): Chief Executive's Commission on Innovation and Technology: First Report. Hong Kong: Author.
- Lee, W. K. (1996): Women Employment in Hong Kong. In M. Nyaw & S. Li (Eds.), *The Other Hong Kong Report*, 277-306, Hong Kong: Chinese University Press.
- Scott, M. (1998): Is IT in Hong Kong Gender-Neutral? *Computerworld Hong Kong*. <http://www.cw.com.hk/Features/f980824001.html> (Retrieved on the Internet, 28 May, 2000)
- Volk, K. & Yip, W.M. (1996): Closed doors: Technology and Gender in Hong Kong. Paper presented at the American Vocational Association Conference, Las Vegas, NV, USA.
- Volk, K.S., & Holsey, L. (1996): TAP: A Gender Equity Program in High Technology. *Technology Teacher*. 56(4), 10-13, International Technology Education Association. Reston, VA.
- Volk, K. & Yip, W. M. (1998a): Gender and Technology in Hong Kong: A Study of Pupils' Attitudes Toward Technology, *International Journal of Design & Technology Education*, The Netherlands: Kluwer.
- Volk, K. & Yip, W. M. (1998b): Summary Report: Hong Kong Pupil's Attitudes Toward Technology, Hong Kong Institute of Education: Author.
- Volk, K.S., Yeung, K.H., & Siu, K.W. (1997): 'Design & Technology in Hong Kong: Good-bye Colonialism, Hello China!' *The Journal of Design and Technology Education* 2(1), 138-144.
- Waley, Arthur. (1946): Chinese Poems, pp 84-85, reprinted in Albert M. Craig, et al, *The Heritage of World Civilizations*, 2d ed., (New York: Macmillan, 1990), p. 217.
- Westwood, R., Mehrain, T., & Cheung F. (1995): Gender and Society in Hong Kong: A Statistical Profile. Hong Kong: The Chinese University of Hong Kong.
- Zuzovsky, R. (1996): The Continuing Gap Between Boys and Girls in Science and Technology Studies: Some Findings, Interpretations and Implications. Paper presented at the Second Jerusalem International Science and Technology Education Conference, Jerusalem, Israel.

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